Building	The Island Memory II
and	from Jackson Harbor Press
Using:	Straight Key Memory - Code Practice Oscillator

Introduction: The Island Memory II kit is an easy way for a Morse code operator to add memory to their present non-memory keyer, straight key or semi-automatic key (bug). The Island Memory II also provides a sidetone which allows it to function as a code practice oscillator. The Island Memory II is similar in function to the original Island Memory but the Island Memory II is much easier to hook up and will work with a hand key or bug.

General notes about building: The components should be inserted a few at a time, soldered in place and then the leads are clipped. The pads and traces are small and delicate - a small tipped, low power (25 watts or less) soldering iron should be used.

The integrated circuits (U1,U2 and U3) are MOS devices as is the keying transistor (Q1). This means that they should be handled as little as possible to prevent static damage. The builder should use a grounding strap and anti-static mat if available or at the very least, work on a grounded metal surface and be sure to touch ground prior to touching the MOS parts.

Building the Island Memory II - Step 1) Get the parts together: All of the necessary board mounted components have been supplied. You will still have to provide off-board items from the stocklist to fully implement the keyer including the enclosure, jacks, battery connector/holder, piezo transducer and mounting hardware. Be sure to get the piezo transducer that requires external drive - basically a very high impedance speaker - an excellent, though large, piezo speaker is the Mouser #: 665-AT-142. A different piezo from Murata should also be considered (Mouser #: 81-PKM22EPP-4001) as it can be mounted directly on the bottom of the circuit board for a "no wires" approach.

Step 2) Identify and orient the components: Most of the components should be fairly easy to identify and place. The .01 uF monolithic ceramic bypass capacitors are very small yellow or blue parts with 2 radial leads spaced .1" apart. You may need a magnifying glass to see the markings on these parts. The .01 uF bypass caps are marked 103 or .01. The .1 uF monolithic bypass cap is packaged separately from the other parts in the circuit board bag. It is also a small blue or yellow part with 2 radial leads with .1" lead spacing, so it's easy to confuse with the three .01 uF parts. The .1 uF part is marked 104 or .1M.

Step 3) Decide how you'd like to mount the Island Memory II in the cabinet: The circuit board can be mounted as is OR the board can be cut into two pieces if the builder wants to have the switches mounted separately. The board can be cut with a tin snips or a small saw. The cutting should be done BEFORE components are soldered to the circuit board to prevent possibly static and/or physical damage from the cutting. Another decision involves selecting the side which the switches will be mounted on. Normally this would be the bottom of the circuit board. Also, be sure to use the bare circuit board to mark the cabinet for drilling the mounting holes and the switch cap holes.

Step 4) Mount and solder the components on the board: Use the parts placement diagram along with the parts list (back of this manual) for the placement and orientation of the parts.

a) Start by inserting the IC sockets with the small notch towards the left edge of the circuit board and then solder them in place. There is a 1 (for pin 1) on the component side of the circuit board at the top of the IC position.

b) Insert the two .1 uF capacitors, C1 and C5 marked 104, at the two positions on the left side of the circuit board and then solder them in place.

c) Insert the three .01 uF capacitors, C2, C3 and C4 marked 103, at the three positions on the bottom edge of the circuit board and then solder them in place.

d) Insert Q1, the 2n7000 transistor, with the flat face to the bottom edge of the board and solder it in place.

e) Form the leads of the three 10 k ohm resistors, R1, R2 and R4 (R3 was removed from the stocklist) by bending one of the two leads over until both leads are roughly 0.1 inch apart. Then insert them at the positions shown on the parts placement diagram and solder in place.

f) Insert C6, the 10 uF capacitor at the position just above and to the left of U2 (the 14 pin DIP part), making sure to place the negative stripe towards the top of the circuit board.

g) Insert and solder U3, the TO92 cased voltage regulator, at the position on the left side of the circuit board. Be sure to leave the leads a little long to allow U3 to be bent out of the way of the mounting hole if required.

h) Insert and solder the four momentary switches. The switches can be mounted on either side of the circuit board. Click the caps place.

Be sure to clip leads of all the soldered components.

Step 5) Check your work: Before proceeding, take the time to check the bottom of the board for solder bridges. Use the Bottom view diagram as a guide to visually check for these shorts. It may help to clean the flux from the board and then use a strong light in conjunction with a magnifying glass to see these problems. Also, double check the orientation of the critical components such as the voltage regulator and transistor. After you are convinced that the board is OK and after you have formed the leads of ICs (U1 & U2) to fit in the sockets, insert the ICs into their sockets, being sure to follow the parts placement diagram for proper orientation (pin 1 indicated by a notch or dimple should be towards the left edge of the circuit board. Now hook up the Piezo transducer (speaker) to the connection points on the bottom edge of the board (including a connection to ground). Also solder the battery (a 9V battery is fine) connector/holder power and ground connections to the left edge of the board.

Next, power up the board. An FB powerup greeting should be sent through the sidetone if the kit is functioning correctly. If you don't hear the FB, power down immediately and

check again for shorts and/or opens. If the Island Memory II appears functional, then power down and hook the unit up to the input & output jacks.

Construction Notes: Note that the output transistor circuit is designed to switch key inputs of 13.8 volts positive or less. Don't attempt to use the Island Memory II with a vacuum tube transmitter (either grid block or cathode keyed) without an appropriate outboard circuit - consult older ARRL handbooks for these circuits OR consider purchasing the Keyall kit from Jackson Harbor Press.

The Island Memory II will normally be operated without a power switch - when it is not in use, the power supply current will drop below 10 uA.

The builder should package the Island Memory II within an all-metal, grounded case for best results. If strange operation is noted during transmit that doesn't occur during disconnected operation, the builder may need to add bypass capacitors and/or series chokes on the switch, key output and key input to prevent RF from disrupting the PIC chip. Shielded cable to the keying device and the transmitter will help prevent RFI problems. R3 (180 ohms) can be added in series from the key input jack to the key input on the circuit board to prevent RFI.

Operation: General notes on using the switches to control the Island Memory II: To give the keys multiple functions, multiple key-press combinations are used. Also, the switches can be pressed and released (PAR) OR pressed and held (PAH) for two seconds.

Generally, PAR is used for actions: send the memory or change the sending speed. PAH is used for settings: change the sidetone frequency or record a memory.

Powerup: After powerup the keyer will send an FB through the sidetone to signal correct operation. Note that the keyer command sidetone is quite low for keyer commands such as the command entry prompts, recording a memory or the FB sent at powerup. The default frequency for routine sending or practice is higher but can be changed with menu item S.

Memories: The Island Memory II has 8 memories in two banks of four. The banks (1 and 2) are selected with a PAR of switches 3 & 4. Bank 1 will be annunciated with an N. Bank 2 will be annunciated with an A. The memories are non-volatile - the memory contents will be retained even if power is removed. The current bank is volatile, it will always power up in bank 1. The memories are 1024 bytes long. The messages are stored as keyup and keydown timed periods. A 20 mS minimum length is used for both keyup and keydown periods. Memory capacity will vary by the keying speed. But for medium speeds (14 wpm and above) each element of Morse code (dit/dah/space) takes one byte of eeprom. This equates to roughly a 180 character size for each of the eight memories (based on the word PARIS).

General notes on playing memories: The memories are played with a press and release of the selected memory switch (1 to 4). A tap of the key (input) OR any of the four memory switches will stop the message play. The memory play can be put into a loop using the L menu item. The delay between memory plays while in loop mode is set with the D menu item. Looping is handy for beacon transmitting or for CQing.

The speed of the memory play can be changed with a simulpress and release of either switches 1 & 2. If switches 1 & 2 are PAR, the Island Memory II will increase the current playback speed. There are four playback speeds as indicated here:

playback speed:	Annunciation
2/3 times normal speed	T
1 times normal speed	E
1.5 times normal speed	I
2 times normal speed	S

After reaching 2 times the normal speed, the next PAR of switches 1&2 will "wrap-around" to the lowest playback speed. The playback speed cannot be changed during a memory play. The annunciation character is sent after the switches are released. The 1&2 simulpress will cycle through the table increasing the speed one notch for each PAR. When the top of the table is reached, the 1&2 simulpress will wraparound to the lowest speed. The 3&4 simulpress will similarly cycle through the table but in the opposite direction (down). Note that the playback speed is NOT stored in nonvolatile memory, the Island Memory II will power up at the normal playback speed. Also note that the recording menu items will reset the playback speed to normal. Finally, the playback speeds will affect the speed at which the menus are played and will also affect the speed of the menu items, notably, the sidetone set will ramp the tone faster at faster playback speeds.

The Island Memory II can be placed into Tune mode (key output and sidetone on) with a simulpress and release of switches 2 and 3. Exit Tune mode with a PAR of the key input or any of the four memory switches.

General notes on recording memories: The memories are recorded by entering the various menus (see following for more info) with a press and hold (PAH) of the switch for the memory to be recorded. The bank should be selected BEFORE starting the recording. After 2 seconds of the PAH, a question mark will be sent. The memory can then be recorded.

Switch 1 Menu:

Command	Explanation	PAR switch 2	PAR switch 3	Default
?	Record memory 1	no effect	no effect	
L	Turn memory 1 looping on or off	turn loop on	turn loop off	off
D	Set the loop delay time	add 1 second	lose 1 second	5 seconds

? - Record Memory 1: To record memory 1, start sending the message after the question mark has completed. To skip to the next menu item without recording, PAR switch 1. After the message is complete, PAR the memory switch to end the recording, the Island Memory II will then return to regular operation. Note that the memory recording will start with the first code element sent, the space between the end of the question mark and the start of the first element is ignored. Similarly, the ending space after the last element send and the PAR

of the memory switch is removed. Normally the messages are recorded "off the air" (no output switching). The operator can elect to record "live" using the R menu item.

L - Turn Memory 1 looping on or off: The L menu item will allow the operator to turn memory playback looping (continuous memory play) on or off. The looping information is stored for each bank independently. To turn on the looping, PAR memory switch 2, a dit will be sent and then the Island Memory II will return to normal operation. To turn the looping off, PAR memory switch 3, a dah will be sent and then the Island memory II will return to normal operation. To advance to the next menu item without changing the looping, PAR memory switch 1.

D - Set the loop delay time: The D menu item will allow the operator to set the loop delay time. The default time is 5 seconds between memory sends. To return to normal operation without changing the loop delay time, PAR memory switch 1. To increase the loop delay time, PAR memory switch 2, the delay will be incremented by 1 second and the delay will be sent. To decrease the loop delay time, PAR switch 3. When the desired loop delay time is reached, PAR memory switch 1 to store the new loop delay time and return to normal operation. Increasing the delay above 99 seconds or decreasing the delay below 1 second will result in a "wraparound" to the other extreme.

Switch 2 Menu:

Command	Explanation	PAR switch 2	PAR switch 3	Default
?	Record memory 2	advance to L	no effect	
L	Turn memory 2 looping on or off	turn loop on	turn loop off	off
S	Set the sidetone frequency	decrease freq	increase freq	

? - Record Memory 2: To record memory 2, start sending the message after the question mark has completed. To skip to the next menu item without recording, PAR switch 2. After the message is complete, PAR the memory switch to end the recording, the Island Memory II will then return to regular operation. Note that the memory recording will start with the first code element sent, the space between the end of the question mark and the start of the first element is ignored. Similarly, the ending space after the last element send and the PAR of the memory switch is removed. Normally the messages are recorded "off the air" (no output switching). The operator can elect to record "live" using the R menu item.

L - Turn Memory 2 looping on or off: The L menu item will allow the operator to turn memory playback looping (continuous memory play) on or off. The looping information is stored for each bank independently. To turn on the looping, PAR memory switch 2, a dit will be sent and then the Island Memory II will return to normal operation. To turn the looping off, PAR memory switch 3, a dah will be sent and then the Island memory II will return to normal operation. To advance to the next menu item without changing the looping, PAR memory switch 1.

S - Set the sidetone frequency: The S menu item will allow the operator to set the sidetone frequency. To return to normal operation without changing the sidetone, PAR

memory switch 1. To increase the sidetone frequency, PAR memory switch 2, the sidetone will turn on and the frequency will go up as switch 2 is either PAR or PAH. To decrease the sidetone frequency, PAR or PAH memory switch 3. Note that the frequency will "wrap around" (high to low OR low to high) at either the high or low frequency limits. When the desired frequency is reached, PAR memory switch 1 to store the new sidetone frequency and return to normal operation. Note that the command sidetone frequency is not affected by this menu item.

<div align="center">Switch 3 Menu:</div>

Command	Explanation	PAR switch 2	PAR switch 3	Default
?	Record memory 3	no effect	advance to L	
L	Turn memory 3 looping on or off	turn loop on	turn loop off	off
O	Turn the sidetone on or off	sidetone on	sidetone off	off

? - Record Memory 3: To record memory 3, start sending the message after the question mark has completed. To skip to the next menu item without recording, PAR switch 3. After the message is complete, PAR the memory switch to end the recording, the Island Memory II will then return to regular operation. Note that the memory recording will start with the first code element sent, the space between the end of the question mark and the start of the first element is ignored. Similarly, the ending space after the last element send and the PAR of the memory switch is removed. Normally the messages are recorded "off the air" (no output switching). The operator can elect to record "live" using the R menu item.

L - Turn Memory 3 looping on or off: The L menu item will allow the operator to turn memory playback looping (continuous memory play) on or off. The looping information is stored for each bank independently. To turn on the looping, PAR memory switch 2, a dit will be sent and then the Island Memory II will return to normal operation. To turn the looping off, PAR memory switch 3, a dah will be sent and then the Island memory II will return to normal operation. To advance to the next menu item without changing the looping, PAR memory switch 1.

O   -   Turn sidetone On or off: The O menu item will allow the operator to turn the sidetone on or off. To turn on the sidetone, PAR memory switch 2, a dit will be sent and then the Island Memory II will return to normal operation. To turn off the sidetone, PAR memory switch 3, a dah will be sent and then the Island memory II will return to normal operation. To return to normal operation without changing the sidetone, PAR memory switch 1. Note that even when the sidetone is off, the operator will still hear the tone for commands, such as the FB at powerup or for the various menus.

<div align="center">Switch 4 Menu:</div>

Command	Explanation	PAR switch 2	PAR switch 3	Default
?	Record memory 4	no effect	no effect	
L	Turn memory 4 looping on or off	turn loop on	turn loop off	off
R	Turn live recording on or off	turn live rec on	turn live rec off	off

? - Record Memory 4: To record memory 4, start sending the message after the question mark has completed. To skip to the next menu item without recording, PAR switch 4. After the message is complete, PAR the memory switch to end the recording, the Island Memory II will then return to regular operation. Note that the memory recording will start with the first code element sent, the space between the end of the question mark and the start of the first element is ignored. Similarly, the ending space after the last element send and the PAR of the memory switch is removed. Normally the messages are recorded "off the air" (no output switching). The operator can elect to record "live" using the R menu item.

L - Turn Memory 4 looping on or off: The L menu item will allow the operator to turn memory playback looping (continuous memory play) on or off. The looping information is stored for each bank independently. To turn on the looping, PAR memory switch 2, a dit will be sent and then the Island Memory II will return to normal operation. To turn the looping off, PAR memory switch 3, a dah will be sent and then the Island memory II will return to normal operation. To advance to the next menu item without changing the looping, PAR memory switch 1.

R - Turn Live recording on or off: The R menu item will allow the operator to turn "live" memory recording on or off. To turn on live recording, PAR memory switch 2, a dit will be sent and then the Island Memory II will return to normal operation. To turn the live recording off, PAR memory switch 3, a dah will be sent and then the Island memory II will return to normal operation. To return to normal operation without changing the live recording, PAR memory switch 1.

Notes: A reset of the Island Memory II can be performed using the following procedure:

1) turn off the power to the Island Memory II
2) press and hold the key input for a few seconds (to discharge the power supply cap)
3) release the key
4) press and hold memory switch 1
5) power up the Island Memory II
6) release memory switch 1 when you hear the FB

The various parameters of the Island Memory II should now be reset, however the memories are not touched.

The 8 memories are pre-programmed as follows:

bank	prompt	switch 1	switch 2	switch 3	switch 4
1	N	73	HI	VVV	OK
2	A	1	2	3	4

Please feel free to email with any questions, comments, suggestions or problems with the keyer- email to: jacksonharbor@att.net

Thanks for choosing the Island Memory II and
Best Regards,
Chuck Olson, WB9KZY

Island Memory II Parts List

Ref	Part Name	Description
U2	16F630	Island Memory II programmed 14 pin DIP PIC microcontroller
U1	24LC64	64 k bit serial eeprom 8 pin DIP
		14 pin socket
		8 pin socket
		circuit board
Q1	2n7000	MOSFET keying transistor
C1		.1 uF bypass capacitor - multilayer ceramic
C2		.01 uF bypass capacitor - multilayer ceramic
C3		.01 uF bypass capacitor - multilayer ceramic
C4		.01 uF bypass capacitor - multilayer ceramic
C5		.1 uF bypass capacitor - multilayer ceramic
C6		10 uF electrolytic capacitor
R1		10 K ohm resistor - brown-black-orange-gold
R2		10 K ohm resistor - brown-black-orange-gold
R4		10 K ohm resistor - brown-black-orange-gold
sw1-4		4 normally open momentary switches
		4 caps for above switches
U3		Seiko 3V regulator

The following items are *NOT* included with the basic kit:

R3	180 ohm resistor (brown, gray, brown, gold)
piezo	piezo sounder (sidetone)
	input jack
	output jack
	9V battery snap
	case, wire, solder, 4-40 sized mounting hardware